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A²

4. (Amended) A primer composition comprising an adhesion promoter for a primer, said adhesion promoter being a silane compound that is a reaction product having a reaction ratio of NCO/NH of from 3/1 to 3/2 between a polyisocyanate and a silane coupling agent having a secondary amino group, the nitrogen atom of which is directly connected to a phenyl group or a derivative thereof, the silane compound having in average at least one NCO group and in average at least one hydrolysable alkoxysilyl group in the molecule and a film forming resin.

A³

7. (New) A primer composition according to claim 4, wherein the polyisocyanate is an aliphatic or alicyclic polyisocyanate.

REMARKS

In response to the above Office Action claim 1 has been amended to include the limitation of claim 3 and claim 3 has been cancelled. Claim 4 has been rewritten in independent form including the subject matter of amended claim 1 and claims 5 and 6 have been cancelled. New claim 7 dependent on claim 4 is similar to claim 2. Thus, claims 1, 2, 4 and 7 remain in this application.

The adhesion promoter for a primer of the present invention, as set forth in claims 1 and 4, is a silane compound that is the reaction product, having a reaction ratio of NCO/NH of from 3/1 to 3/2, between a polyisocyanate and a silane coupling agent having a secondary amino group, the nitrogen atom of which is directly connected to a phenyl group or a derivative thereof. The silane compound has in average at least one NCO group and in average at least one hydrolysable alkoxysilyl group in the molecule.

The silane compound of the present invention obtained by the reaction at these reaction ratios contains in average one or more NCO groups and in average one or more hydrolyzable alkoxysilyl groups in the molecule. Since it has both reactive functional groups in the molecule, the silane compound provides an increased tackifying effect (see page 10 of the specification).

The above reaction generates a urea group. It has heretofore been difficult to store the resultant silane compound for a long time without any deterioration in its activity due to the high reactivity of the active hydrogen of the urea group. The active hydrogen of the urea group is highly reactive with unreacted NCO groups in the molecule (see page 3 of the specification). On the contrary, in the silane compound of the present invention, a phenyl group or its derivative is directly bonded to the nitrogen atom and this inhibits the reactivity of the active hydrogen of the generated urea group due to its steric hindrance and electron attractive effect. Thus, the silane compound does not have a diminished activity after a prolonged storage and can impart high adhesion. Hence it can be advantageously used as an adhesion promoter for a primer (see page 11 of the specification).

In the Office Action, the Examiner rejected claims 1-6 under 35 U.S.C. § 103(a) for being obvious over U.S. Patent No. 4,652,012 to Rizk et al (Rizk) in view of EPO 676 403 to Feng et al (Feng).

As noted by the Examiner, while the primary reference to Rizk shows the reaction product of a polyisocyanate and an amino silane, it fails to teach the essence of

the present invention, which is the use of a secondary amino silane where there is a phenyl group or a derivative thereof bound directly to the nitrogen of the amino group.

not in claim →

The active hydrogen in the urea group of reacted aliphatic amino silanes with aliphatic isocyanates such as described in Ritz is highly reactive with unreacted NCO groups in the molecule. As noted, as a result, it has been difficult to store the resultant silane compound for a long period of time without deterioration in its activity due to the high reactivity of the active hydrogen of the urea group. Ritz is not concerned with storing the resultant silane compound because the silane compound of Ritz is the starting material for the second step of the method of Ritz (see below line 50 in col. 3 of Ritz). The silane compound (the isocyanatosilane adduct) is mixed with a further isocyanate and polyol to obtain a polyurethane polymer having isocyanate groups and pendant alkoxysilane groups.

Feng describes arylaminoisobutylsilane end-capped urethane polymers which is the reaction product of the novel arylaminoisobutylsilanes of Feng and an isocyanate-terminated polyurethane prepolymer. Arylaminoisobutylsilane is an amino silane having a secondary amino group, the nitrogen atom of which is directly connected to a phenyl group and a polyurethane prepolymer is a polyisocyanate.

not in claim →

The Examiner therefore believes it could be obvious to substitute the amino silane of Feng for the amino silane of Ritz. However, it is submitted that this is based solely on a reading of applicant's specification, because there is nothing in Feng to suggest that if such a substitution were made the storage problems associated with the silane compounds of Ritz could be avoided.

Moreover, there are no unreacted NCO groups to be reacted in the silane compounds (arylaminoisobutylsilane end-capped urethane polymers) of Feng. On the contrary, Feng teaches on page 5, lines 23-29 that "Vulcanizable arylaminoisobutylsilane end-capped urethane polymers of the present invention are made by reacting one or more arylaminoisobutylsilane with one or more isocyanate-containing polyurethane prepolymers. An excess of the silane material, typically about 5% to 25%, and preferably about 5% to 10%, should be employed to insure a complete reaction of all the isocyanate terminal groups on the prepolymer and any residual free isocyanate monomer. Preferably, there should be less than 5%, more preferably less than 1%, and even more preferably essentially 0%, unreacted isocyanate groups". As mentioned above, unreacted NCO groups in the silane compound of the present invention give it an increased tactifying effect. Feng describes nothing about the adhesive properties of the silane compound.

The substitution suggested by the Examiner might be obvious if it resulted in a composition that exhibited "improved elongation, flexibility and lower modulus of elasticity," but when it results in a property not even hinted at, i.e., an adhesion promoter having a high and long time stable adhesion property, it cannot be considered obvious.

Moreover, since Feng does not disclose the claimed NCO/NH ratio, the combination of references does not even establish a *prima facie* case of obviousness. As required by M.P.E.P § 2143, all of the claim limitations must be taught or suggested by the combination of references.

It is believed claims 1, 2, 4, and 7 are in condition for allowance.

In view of the foregoing amendments and remarks, Applicant respectfully requests the reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: July 2, 2003

By: 

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APPENDIX to 09/920,712
(07409.0024-00000)

1. (Amended) An adhesion promoter for a primer, comprising a silane compound that is a reaction product having a reaction ratio of NCO/NH of from 3/1 to 3/2 between a polyisocyanate and a silane coupling agent having a secondary amino group, the nitrogen atom of which is directly connected to a phenyl group or a derivative thereof, the silane compound having in average at least one NCO group and in average at least one hydrolysable alkoxysilyl group in the molecule.

4.

(Amended) A primer composition comprising an adhesion promoter for a primer [of claim 1], said adhesion promoter being a silane compound that is a reaction product having a reaction ratio of NCO/NH of from 3/1 to 3/2 between a polyisocyanate and a silane coupling agent having a secondary amino group, the nitrogen atom of which is directly connected to a phenyl group or a derivative thereof, the silane compound having in average at least one NCO group and in average at least one hydrolysable alkoxysilyl group in the molecule and a film forming resin.